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The American Fertilizer

APRIL 25, 1942 No. 9

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AMERICAN FERTILIZER

"That man is a benefactor to his race who makes two blades of grass to grow where but one grew before."

Vol. 96 APRIL 25, 1942 No. 9

Safeguarding a Plant Against Sabotage and Espionage*

By JAMES W. IRWIN

Assistant to President, Monsanto Chemical Company, St. Louis, Mo.

WARTIME conditions impose upon management sharply increased responsibility for protection of manufacturing plants from malicious damage, and employees from injury because of the action of saboteurs. The protection of industrial facilities and personnel is a responsibility to stockholders that management must carry out just as religiously as it does the protection of the financial and other interests of the owners. This responsibility has always existed, but has sometimes been overlooked in the press of normal peacetime problems. With the nation at war, plant protection becomes not only a company responsibility, but a matter of community and national interest as well.

Plant protection involves the prevention of deliberate and malicious damage to manufacturing facilities, products, and related property by individuals seeking to hinder industrial production for war. In this sense it does not include the regular protection and safety programs, although these should be tied in closely.

Based upon experience in the first World War and during the present conflict up to this time, there are two approaches that potential saboteurs can take. One approach is through individuals who normally have access to the manufacturing property—employees, service men, suppliers of raw materials, and employees of contractors and other firms doing work on the property.

The second hazard arises from those attempting to gain access by force or subterfuge. These points of vulnerability are of equal importance, and although they are handled in different ways, protection against them must be coordinated to insure effectiveness. Even the strongest fences are of little effect when outsiders can bluff their way through the main gate or ride in as a truck-driver's helper.

Although protection of plants producing chemicals encounters a problem peculiar to them, the procedure used by Monsanto Chemical Company is generally applicable to most manufacturing establishments. At plants of this company, strict measures have been enforced for two years in anticipation of war conditions, but these have only supplemented those which had been followed for many years.

In order to prevent unauthorized persons from gaining access to manufacturing facilities as employees, every new employee is fingerprinted, and the prints are cleared by the office of the executive vice-president with the Federal Bureau of Investigation. Applicants for work are investigated to the extent of uncovering any connection which would tend to place them in a "suspect" category. Despite the thoroughness of such prior investigations, the number of applicants rejected on the basis of the findings is virtually negligible. This makes apparent the fact that the mere existence of such measures tends to discourage application for employment by persons who know that their background would bar them or, if employed, make them suspects in the event of untoward incidents.

All employees, from the office boy to the president, are issued photographic identification passes. These passes must be presented when

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* Reprinted from Executives Service Bulletin, published by the Metropolitan Life Insurance Co., New York.

Pasture Notes - No. 13

Compiled by R. H. LUSH

Pasture Specialist, The National Fertilizer Association

Arkansas

Lespedeza Needs Fertilizer. Lespedeza fertilized with an average of 100 pounds of concentrated superphosphate on 146 Drew County farms averaged 1.56 tons of hay per acre. Unfertilized lespedeza on the same farms averaged only 1.08 tons per acre, or a 45 per cent increase, reports Clifford Alston, County Agent.

California

Good Pastures From Range Land. Dale Butler, Fresno, suggests that range areas would pay better and more stock could be carried if a real effort is made to introduce the legumes on well selected areas of about one-fourth the present area used. Three problems of grassland management are: (1) how to produce grass at seasons of the year when most urgently wanted; (2) how to farm with a view not merely to maintaining but to increasing farm fertility; and (3) how to manage pastures to produce young, rapidly growing grass of maximum nutritive value.—Texas Livestock Journal, Feb., 1942.

Georgia

Heavy Applications Most Efficient. At the Georgia Experiment Station various winter clovers are seeded in Bermuda grass and followed by lespedeza in summer. Varying amounts of nitrogen were applied in summer with mineral fertilizers in the fall. Considering total yields of all species for the season 1940, limestone alone gave an increased production of 63.8 per cent; heaviest phosphate treatment, 65.1 percent; four and one-half acre inches of supplementary water, 63.6 per cent; supplementary water with limestone, 125.2 per cent; and 128 pounds of nitrogen with complete minerals and water, 497.3 per cent. The efficiency of the nitrogen in terms of increased yields obtained was greatest with the heaviest application. About 24 pounds dry matter were obtained from each unit of nitrogen used at the rates of 32 or 64 pounds per acre, while over 30 pounds dry matter from each unit were obtained when 128 pounds of nitrogen were used, in connection with adequate phosphate and potash, regardless of lime or water treatment. It is concluded from these studies that commercial nitrogen should be applied to Bermuda grass about June 1st and in late July to give increased production in late summer and fall.—53rd An. Rpt., Ga. Agr. Exp. Sta.

Illinois

Fertilizer Increased Production. An application of 10-6-4 to 8½ acres of mixed grasses increased the production and test of 21 Jersey cows, states Kenneth Pate of McHenry County. When transferred to 10 acres of unfertilized grass, the herd dropped quickly in production and test. Switched back to the fertilized pasture, production went up again quickly. The full cost of the fertilizer was returned through increased milk flow in a few weeks.—Cappers Farmer, March, 1942.

Indiana

Dairymen Pasture Alfalfa. Last June, 104 of 400 farms studied were using alfalfa pasture, and in September 172 of the same farms were following this practice, reports G. A. Williams, extension dairyman. The use of an alfalfa-timothy mixture, liberal feeding of cows, and use of salt and water are suggested to guard against loss from bloat.

Feed the Soil to Feed Livestock. Permanent pastures are becoming poorer. Part of the plant food has been sold off the farm in the form of milk, beef, wool, sheep or lambs, etc. A great deal of the fertility has been spread along the lanes and scattered over other fields. Even if all products are fed on the farm, it is not possible to keep up farm fertility with only manure.—Indiana Farmer's Guide, Feb. 1, 1942, J. C. Koekzema.

Iowa

Fertilize Legumes. Phosphate demonstrations in Iowa for a period of five years indicate that fertilizer is good insurance for a stand and often will give considerable increase in growth. It should be applied immediately previous to seeding of the legume, either when seeded alone or with a small grain nurse crop, states Bruce M. Kilpatrick, extension agronomist.—Better Iowa, Mar. 2, 1942.

Kansas

Superphosphate Doubles Alfalfa Yield. Farmers in Allen County find they can double their alfalfa yields by the use of only 100 pounds of superphosphate. J. M. Liebau obtained 1.28 tons per acre as compared to only .56 tons on an untreated acre. Heater Brothers obtained 2.08 tons of alfalfa on fertilized soil as compared to only .71 ton on untreated soil.—Kansas Farmer, Feb., 1942.

Kentucky

Beef at a Profit. The average of 13 years' grazing of fertilized pastures at the Western Kentucky Substation shows 3½ times as much beef per acre at one-third the cost per pound beef for phosphate-treated pastures as on a similarly managed unfertilized pasture. This is at the rate of 2,760 pounds of beef per ton of 20 per cent superphosphate used.—S. J. Lowery, The Progressive Farmer, Mar. 1942.

Louisiana

Profitable Beef with Fertilizer. Land that had grown cotton and corn for 75 years on the E. C. Parker farm near Ringgold produced 217 pounds of beef per acre in 76 days the first year it was seeded to pasture and fertilized with 300 pounds of 4-12-8 per acre, as compared to 156 pounds of beef per acre from land not fertilized.

Maine

Fertilized Pastures Doubled Milk Yield. D. S. Fink, agronomist, reports that 23 fertilized pastures in 1941 averaged 3,039 pounds of milk per acre. Six unfertilized pastures, including two which had been fertilized prior to 1941, averaged 1,520 pounds of milk per acre, and approximately one-half as many cow days of grazing. At the experiment farm at Highmoor, 1,000 pounds of 10-10-10 produced seven times as much milk and days grazing as the unfertilized pasture or at the rate of 8,900 pounds of milk per ton of fertilizer used.

Maryland

Correct Soil Deficiencies. Much seed and labor is wasted by farmers every year in trying to improve their pastures by disking or plowing and reseeding rather than by correcting soil deficiencies and the faulty management in grazing poor growth. Such thin and unproductive pastures are often incorrectly referred to as "overgrazed" but in reality are "running out."—Maryland Farmer.

Massachusetts

More Milk with Fertilizer. "If you can secure adequate fertilizer for pasture improvement this year, by all means do so," says C. H. Parsons, Massachusetts State College. Other pasture management suggestions are to graze one of the hay fields to be cut later, mow level areas of the pasture in late June or July, and rotate the dairy herd on more than one hay field or pasture.—New England Homestead, Mar. 7, 1942.

Michigan

Emergency Hay Crop. Applying a complete fertilizer to old meadows is a labor-saving proposition as it may avoid plowing and fitting. The Michigan Experiment Station found that 400 pounds of a 10-10-5 or a 10-6-4 fertilizer produced the most economical increase in timothy.—American Agriculturist, Mar. 14, 1942.

Minnesota

Fertilized Crops Supply Minerals. Henry O. Larson, New Ulm, reports that 186 hogs on an unfertilized 15-acre corn field consumed 175 pounds of bonemeal a week from self-feeders. When the same hogs were turned on an adjoining 15-acre fertilized field of corn, they ate only 50 pounds of bonemeal a week. The difference is attributed to the higher phosphorus content of the corn from the fertilized field. Other Minnesota farmers are finding that crops and pasture lands respond to additional plant food.—The Farmer, Feb. 21, 1942.

New Hampshire

Use More Fertilizer and Buy Less Feed. The average of seven years' results at the Livingston Farm show that when 80 pounds of phosphoric acid were applied per acre it costs $14.25 to produce one ton of hay; an additional 75 pounds of potash reduces the cost to $5.30 per ton; the addition of 16 pounds of nitrogen further reduced the cost to $5.16 per ton; and when lime was added to the complete fertilizer the cost was $4.65 per ton of hay. J. L. Haddock, extension agronomist, suggests that New Hampshire farmers purchase at least $10.00 worth of fertilizer for each dairy cow or spend $1.00 for each $4.00 spent for feed.

New Jersey

Feed the Land for Freedom. "Liberal applications of fertilizer will increase the production of hay, silage, and pasture," states Dr. O. L. Lepard, associate professor of dairy husbandry. "In addition to the immediate increase in yield, well nourished hay lands will maintain a satis-

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Wartime Starter Solutions to Meet Present Emergency*

By C. B. SAYRE

BECAUSE the ingredients of some of the best starter solutions tested by the writer in the past years are no longer available, an effort has been made to determine the usefulness of substitute materials that are easily obtainable. The results on tomatoes are presented in order to assist growers in 1942 to meet the problem created by the war shortage of materials formerly recommended. Previous experiments have shown that a small amount of fertilizer used as a starter solution will reduce the loss of plants in transplanting, stimulate earlier maturity, and increase yields. The solutions are particularly effective on tomatoes, peppers, eggplants, melons, and cabbage.

In four years' experiments at Geneva, over 100 different formulas and rates of application have been compared, including certain hormones and vitamin compounds as well as various fertilizer mixtures. Thruout the tests one combination has proved particularly outstanding. This is a mixture of two parts of Ammo Phos 11-48-0 and 1 part of nitrate of potash, 13-0-44. This mixture has an analysis of 11 per cent nitrogen, 32 per cent phosphoric acid, and 14 per cent potash. Unfortunately the supply of both of these materials is entirely cut off by the war situation.

Another outstanding mixture has been the 13-26-13 formula, composed of Uramon, nitrate of soda, Ammo Phos and muriate of potash. All of these ingredients except the muriate of potash are either cut off entirely or are very restricted in supply.

Since the use of starter solutions has now become an established practice with many commercial growers, it is evident that the development and testing of new mixtures that are now obtainable under war conditions would be of assistance to growers in meeting the government's call for increased production of vegetable crops.

Emergency Tests

The shutting off of supplies of the usual materials employed in starter solution mixtures occurred after the close of the 1941 growing season, therefore the only opportunity for testing substitute mixtures was by means of greenhouse tests.

Accordingly a series of tests of emergency starter solutions was made during the winter of 1941-42 in the greenhouses at Geneva, using two soil types. One soil was a well buffered, fairly heavy soil classified as Ontario loam. Soils similar to this are used very extensively in the production of canning crops thruout western New York. This particular soil was slightly alkaline in reaction, having a pH of 7.44. The entire series was duplicated on a poorly buffered, sandy soil classified as Dunkirk sand. This soil was slightly acid, having a pH of 6.25. A more acid soil would have made the tests more comprehensive, but this was the most acid, poorly buffered soil obtainable at the time. The ground was frozen when the emergency situation developed but these two soils had been brought into the greenhouse earlier for some other experiments and seemed most suitable for these emergency starter solution tests.

The tomato plants were grown in flats in a composted soil in the usual commercial manner for canning tomatoes (108 plants per flat). They were 8 weeks old at the time they were transplanted when the starter solutions were applied. No fertilizer had been added to the field soils in addition to the starter solutions. This may have emphasized the stimulating effect of the solutions. However, this experiment measured the marked differences in growth that occurred within 23 days after the plants were transplanted, which is the period when the effect of starter solutions is most pronounced. This is because starter solutions are poured around the roots of plants whose root systems have been drastically reduced and that must become re-established in new soil. For that reason a good starter solution whose immediately available nutrients are supplied at this critical time, is particularly effective in stimulating the plant. For a period of 2 to 3 weeks it will tend to overshadow the effect of any other fertilizer in the soil except in soils that have been very heavily fertilized for a number of years.

The experiment was designed to make the following comparisons: (1) The best previously proved starter solutions with various mixed fertilizers and materials now obtainable

* Reprinted from "Farm Research," April issue, published by the New York Agricultural Experiment Station, Geneva, N. Y.

during the war emergency; (2) a 5-pound with a 10-pound rate of application of mixed fertilizers per 50 gallons of water; (3) nonacid with acid-forming mixed fertilizers for starter solutions; and (4) the behavior of the different treatments on a well-buffered alkaline soil and on a poorly buffered, slightly acid soil. The value of magnesium in starter solution mixtures was also tested. In all of the treatments ¼ pint of solution was used per plant, pouring it around the roots at the time the plant was set in the soil.

In these tests there were only 12 tomato plants per treatment, but the plants were carefully graded for uniformity at the beginning of the experiment. Within each treatment, and between the different treatments the responses of the plants in each soil were remarkably consistent. The limited time and space did not permit growing the plants to fruiting stage, so that no yield records were obtained. It is recognized that the conclusions drawn from this single greenhouse test are subject to verification in the field. It is believed, however, that the urgency of the present situation justifies reporting the results at this time.

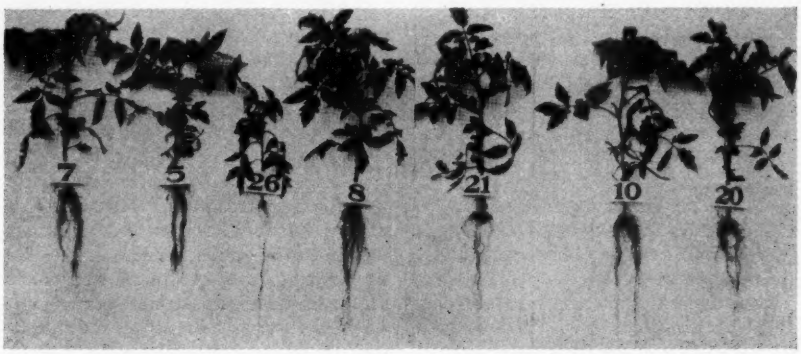

FIG. 1. Showing typical differences in growth of tomato plants 23 days after starter solutions were used. No. 7 = 10 pounds of 3-12-6; No. 5 = 10 pounds of 5-10-5 (nonacid); No. 26 = Check (water only); No. 8 = 10 pounds of 4-16-4 (acid); No. 21 = 4 pounds of 13-26-13; No. 10 = 10 pounds of 5-10-5 (acid); and No. 20 = 4 pounds of 11-32-14 mixture.

Measuring the Results

The comparisons given in Table I were based entirely on the *size* and *appearance* of the plants, see Fig. 1, and on the percentage of plants that formed *blossom clusters* within 23 days after the treatments were applied. This was the only index obtainable regarding stimulation of the plants to earlier maturity and increased yields. For the quality rating of the plants (Table I), an expert commercial plant grower was asked to classify the plants in each treatment. This quality rating was made exactly 3 weeks after the starter solutions were applied. Four classes were made; namely, Excellent (E), Good (G), Fair (F), and Poor (P).

In the treatments that scored Excellent, the plants were sturdy, and of a healthy green color, growing vigorously with strong shoots and large blossom clusters. Those rated Good were not quite so vigorous growing, and were slightly spindling, and some showed a tinge of offcolor suggesting nutrient deficiencies. They were good plants for transplanting, however, and were not stunted at all. Those that were given a Fair rating were somewhat stunted and spindling in growth, with evidences of nutrient deficiencies. However, they were plants that would probably make a satisfactory crop. Those classified as Poor were stunted, small, spindling, and lacking in vigor, and were markedly inferior to the other groups.

These results furnish a reliable guide in regard to effective starter solutions, the kinds and ratios that may be safely used, and the rates of application. Altogether, 27 treatments were included in this greenhouse test, but 7 of them showed no promise, and are omitted in this discussion, which is concerned with the 20 treatments which seem best to serve the present purpose.

Most Effective Substitutes

Referring to Table I, treatments Nos. 20 and 21 will be used as the basis of comparison, because these have been proved in field experiments to be particularly effective as starter

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What a Ton of Average Fertilizer Produces.

In the war emergency it is not so much the profit to the farmer or to the fertilizer manufacturer that counts but rather how much food or other necessary war material a ton of fertilizer will produce.

Largely from results obtained in two national surveys made by The National Fertilizer Association it is possible to estimate the increased yields obtained from fertilizer used on many crops.

In the two surveys which were made in 1928 and 1938, over 80,000 farmers in fertilizer consuming territory were interviewed and each one was asked to estimate the yields with and without fertilizer for one or two important crops. Thus for each of the principal crops—corn, cotton, wheat, potatoes, and tobacco—several thousand estimates were averaged. For other crops the estimates were not so numerous and of course less significant.

The increased yields, therefore, represent average fertilizer use has become established, in other words, where it pays to use it. There is no intention to imply that similar results are to be expected in some new territory where soils are still naturally fertile or where lack of moisture or some other factor limits yields.

There is no satisfactory method of averaging experimental results obtained in all sections of the country, or certainly no accurate means of weighing them; but comparison of these results with the farmers' estimates indicates that the latter are reasonably conservative and fairly well in line with the experimental results.

The figures given for milk and meat production refer to fertilizer used on pastures. They were not obtained from the surveys but are thought to reflect rather conservatively the results that have been obtained in experiments.

Farmers' estimates of rates of application and increased yields from fertilizer use are given below for ten of the more important crops:

Crop	Pounds fertilizer per acre	Yield per acre — Without fertilizer	With fertilizer	Increased yield
Corn (bu.)	224	20	34	14
Wheat (bu.) ..	212	13	22	9
Potatoes (bu.)..	1,267	88	205	117
Cotton (lb. lint)	404	134	342	208
Tobacco (lb.)..	910	453	1,076	623
Apples (bu.)...	395	212	353	141
Soybeans (bu.).	263	17	24	7
Snap beans (bu.)	1,067	43	114	71
Tomatoes (bu.).	1,351	117	264	147
Peanuts (bu.)..	248	32	58	26

NEW QUARTERS FOR WILSON & GEO. MEYER & CO.

The well-known distributing firm of Wilson & Geo. Meyer & Co., of San Francisco, have moved to new offices covering the entire fifteenth floor at 333 Montgomery St. The company maintains branch offices in Los Angeles and Seattle and covers the western coast in the distribution of industrial and agricultural chemicals. Among the fertilizer material manufacturers which it represents are the American Potash & Chemical Corp.; Consolidated Chemical Industries; Stauffer Chemical Co.; Harshaw Chemical Co.

GERMAN POTASH SALES DECREASE

Despite efforts to replace former markets for potash by increased sales in the Balkans, it has been reported reliably that sales of potash salts and by-products by the German Potash Syndicate declined somewhat in 1941 compared with 1940. German potash producers considered that 1940 was bad enough, not only because shipment overseas was impossible because of the blockades, but also sales in Denmark, Netherlands, and Belgium were down. The German authorities, who hoped to obtain more food from the Balkans, supported the syndicate in its efforts to offset the loss of markets elsewhere by increasing sales in the Balkan countries, but potash purchases in that quarter likewise failed to increase.

ADDITION TO TRONA PLANT

It is reported in the press that the American Potash and Chemical Corporation has placed contracts for the construction of a large addition to its plant at Trona, Cal. The cost of the addition will be over $1,000,000. The Trona plant has been recovering potash, borax and other chemicals from the brines of Searles Lake continuously since 1916.

I. M. C. AND UNION POTASH MERGED

On April 6th, the details of the merger between the International Minerals & Chemical Corporation and the Union Potash & Chemical Co. were completed. The potash business of the Union Company is now being conducted by the Potash Division of International Minerals & Chemical Corporation.

Fertilizer Tonnage, 1941

New York

Prof. E. L. Worthen of Cornell University has issued a fertilizer tonnage report for New York for 1941 which was compiled by the Department of Agronomy of Cornell University in cooperation with the National Fertilizer Association. The total tonnage of all fertilizer sold in 1941 was 379,819 as compared to 369,911 tons in 1940 and the 1935-39 average of 320,375 tons. The total tonnage of all mixed fertilizers was 223,161, and of all materials 156,658. The latter figure included 130,462 tons of superphosphate. The combined tonnage of the twelve leading grades included 81.3 per cent of the total. Sales of analyses approved by Cornell University totaled 147,164 tons or 66 per cent of the total mixed fertilizer tonnage, but only 20 per cent of the total was represented by grades containing less than 20 units of plant food. Each of 49 analyses out of 104 analyses sold represented less than 100 tons.

Michigan

The Michigan report on fertilizer sales in 1941 has been compiled by the Soils Science Department of Michigan State College. In his letter transmitting copies of this report to county agents, club leaders, and agricultural teachers, Dr. C. E. Millar states: "The high percentage of the fertilizer sold which is in accord with the recommendations of the college, as well as the unusually high percentage of mixed fertilizers containing 20 per cent or more of plant food, is a direct result of the wholehearted cooperation of the fertilizer companies, agricultural agents, club leaders, agricultural teachers, and extension specialists."

Total sales in 1941 were 168,987 as compared to 166,564 in 1940. Spring season sales total 120,905; fall season sales 48,082. Mixed fertilizer sales totaled 143,903; superphosphate, 16,853; other materials, 8,231. The percentage of tonnage represented by grades recommended by the Soils Department was 92.15, and the percentage of mixed goods containing 20 per cent or more of plant food was 97.27.

Ohio

Ohio fertilizer sales rose to an all-time peak in 1941, 392,677 tons. Average analysis was 2.47-12.34-6.51, compared with 2.34-13.00-6.07 in 1940. Sales of 2-12-6 accounted for 60 per cent of all mixed goods; sales of the other 82 grades accounted for 40 per cent.

Emergency Forage Crops

By J. S. Owens, University of Connecticut

* Abstract of a paper presented at Fertilizer Conference, Amherst, Mass., March 3, 1942.

More and better quality forage crops are now urgently needed in Connecticut. Marked improvements have taken place the past few years but there is still a shortage of hay on some seasons, and much grain is purchased every season which would not be needed if forage supplies were adequate. The place for well developed crop raising programs has been demonstrated by farmers who have cooperated not only by planning cropping systems but also by keeping records. Pastures and pasture systems, for instance, have been measured through 600 farm records kept over the last twelve years. With such experiences there no longer needs to be guessing about the contribution pastures can make to dairy farming.

The present need for forage is acute because of more animals being kept per farm, a serious labor shortage, a possible decreased fertilizer supply, a small carry-over of hay from 1941, some failures in 1941 seedings, higher cost of purchased feeds and even a possible crippling of transportation for feed stuffs.

The most economic improvement of hay and pasture crops has involved long time improvements and some expenditures which were in the nature of "gilt edge" bond investments. Liming, use of phosphorus-carrying fertilizers, legume seedings, and much pasture improvement come under this category. Farmers who are making such expenditures are now in a preferred position. A moderate expansion of their improvement program will be sufficient.

There are many possibilities for quick improvements, some of which may be thoroughly good investments at present even though they are distinctly second choices under more normal situations. These include a liberal application of a high-nitrogen fertilizer on grass sods and certain pastures, raising millet and sudan grass for hay or pasture and increasing the corn acreage for both grain and silage.

Oats, barley and rye offer special possibilities for pasture, and for soil protection. They often fit in between other crops and may require little or no extra labor. Oats furnish exceptionally high quality pasture at the time other pastures are beginning to wane. Seedings of grasses and legumes are favored by pasturing the oats as compared with cutting for hay or grain. Summer-sown barley will make a large amount of excellent fall pasture when well fertilized. Rye will produce late fall and early spring pasture, also it is an excellent companion crop for early spring seedings. The cereal crops are coming into favor rapidly as additions to pasture programs.

Experience over a 50-year period at the Storrs Experiment Station justifies a comparison of a large number of crops. Alfalfa has produced an average of around 3,100 pounds of total digestable nutrients per acre, the highest of any perennial forage crop. Soybeans have been second to alfalfa as a protein producer, 800 pounds per acre as compared with 1,100 pounds. Silage corn, with 4,900 pounds of total digestable nutrients per acre, has easily led all crops in amount of feed produced. This large yield (not as large as many farmers secure) suggests the desirability of continuing corn growing on farms with limited acreages. Corn also yields well on seasons when there is insufficient moisture for good hay and pasture.

There is abundant evidence that large savings can be made through growing a liberal supply of high quality forage. The use of fertilizers is an essential part of every well planned cropping system in Connecticut. The judicious use of fertilizers is almost certain to bring satisfactory returns. Many dairymen use none or too little, and few if any use too much. Increased production of dairy products is largely dependent upon still larger use of fertilizers.

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FERTILIZER MATERIALS MARKET

NEW YORK

Fish Material Producers Discuss Situation. Fishing Operations Restricted to Daylight Hours. Most Materials in Short Supply. Higher Superphosphate Prices Expected.

Exclusive Correspondence to "The American Fertilizer."

NEW YORK, April 21, 1942.

Representatives of the grinders of fish scrap met in Washington last week in an effort to clarify the situation re the $3.00 differential between the ceilings on fish scrap and fish meal. Evidently, there is some difference of opinion as to whether the $3.00 differential must be maintained, but as far as the grinders are concerned, the meeting was most satisfactory. However, it is very problematic as to what the supplies of fish scrap might be as an order has now been made restricting fish operations to daylight, which in all probability would make the operation of fishing boats too expensive.

There has been very little change in the markets on chemical fertilizers, sulphate of ammonia and potash remaining tight and nitrate of soda being delivered only against definite monthly allocation. Sellers have still not completed deliveries against sulphate of ammonia and potash contracts and whereas deliveries of potash will probably be fairly well completed by the end of May, it is very doubtful that sellers will have fulfilled their contract obligations by that time on sulphate of ammonia deliveries. There is some demand for spot cars of sulphate of ammonia and potash but it is most difficult to get manufacturers to take on any new business.

Superphosphate

Officials in Washington are allowing users of sulphur to store any quantities possible against future use but, due to the necessity of transporting most of this material by rail, as well as phosphate rock, it is very likely that prices on superphosphate will be increased in general before long. This higher price on superphosphate is indicated on some trades during the past week.

Nitrogenous

There has been no change in this market. There is very little demand but no material pressing and prices are firm.

BALTIMORE

Spring Shipping Season Under Way. Scarcity of Some Materials Evident. Burlap Situation Becoming More Critical.

Exclusive Correspondence to "The American Fertilizer."

BALTIMORE, April 21, 1942.

The spring shipping season is now on, and all fertilizer materials are scarce and in short supply.

Ammoniates.—The market on dry rendered tankage is again higher, being in the neighborhood of $6.75 per unit of nitrogen, while wet rendered tankage is nominally quoted at $6.30 per unit of nitrogen and 10 cents per unit of B.P.L. which, of course, takes it out of the class of fertilizer material.

Nitrogenous Material.—The market continues quiet and the nominal price is unchanged around $4.00 per unit of nitrogen, f.o.b. Baltimore.

Sulphate of Ammonia.—There have been a number of inquiries on the market, but there is no re-sale material offering, and none of the manufacturers have any surplus. In fact, practically all manufacturers are short of this commodity.

Nitrate of Soda.—Allocations made by OPM have drastically cut manufacturers' normal requirements, but such limited tonnage as is obtainable is still being billed on the basis of $33.00 per ton for the Chilean, Champion Brand, in 100-lb. bags, with usual differential for 200-lb. bags and in bulk, ex warehouse Baltimore.

Fish Meal.—Stocks in the hands of dealers are at a low ebb, and there has been no activity in the market as the ceiling fixed on unground scrap, being only $3.00 per ton less than meal, makes it impossible for sellers to operate and break even.

Superphosphate.—There are reports of sales of run-of-pile material at $10.40 per ton of

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2,000 lb., basis 16 per cent and $11.00 for flat 16 per cent grade, both in bulk, f.o.b. Baltimore. Due to the fact that it is now necessary to bring phosphate rock from mines to Baltimore by cars, manufacturers' costs are advancing, and when their present stocks of raw material are depleted, it would not be surprising to see materially higher prices prevailing. due to increased cost of manufacture.

Bone Meal.—There is nothing new to report and business is practically at a standstill.

Potash.—Most fertilizer manufacturers will be able to get through the season with their present stocks and there is no surplus being offered on the market for resale.

Bags.—The burlap situation is quite critical due to Calcutta, the shipping port, being so close to the Far-Eastern war zone, as a result, all quotations are strictly nominal. Such limited quantities of new burlap bags as are available are being held at 23 to 24 cents each for plain, new, 10 oz., basis 40 cut 54 in., f.o.b. Baltimore, the advance being due to the tremendous increase in war risk insurance which has recently gone up as high as 25 per cent.

CHARLESTON

Spring Shipments Slacken because of Material Shortage. Freight Shortage Impedes Imports.

Exclusive Correspondence to "The American Fertilizer."

CHARLESTON, April 21, 1942.

The movement of mixed goods has began to slacken down as manufacturers are unable now to obtain any mineral ammonia.

Nitrogenous.—Supplies of this continue fairly scarce. The market for prompt shipment is around $3.00 per unit of ammonia ($3.64½ per unit N), f.o.b. western points; $3.70 per unit of ammonia, $4.49½ per unit N) ex vessel southeastern ports, with very limited stocks.

Blood.—This is priced around $5.35 per unit of ammonia ($6.50½ per unit N) c.i.f. ports, but this is nominal as freight is unobtainable. The Chicago market is $5.60 per unit of ammonia ($6.80½ per unit N).

Fish Meal.—This material is unobtainable.

Cottonseed Meal.—The 8 per cent grade is selling for $41.00 at Atlanta; $35.50 at Memphis.

Superphosphate.—No offerings are in the market.

TENNESSEE PHOSPHATE

Work in Phosphate Field Continues at High Level. Union Activities Increase. I. A. C. Acquires New Phosphate Deposits.

Exclusive Correspondence to "The American Fertilizer."

COLUMBIA, TENN., April 20, 1942.

Activities in the Tennessee phosphate field are at a high tempo in all lines, including as usual in the case of Tennessee the rapid sending of young men as volunteers for service in our country's cause. This is beginning to sharply affect the supply of labor in the field.

Spring is rapidly getting into condition to be called summer, with farm work at a high point while the various construction jobs in many lines are rapidly showing advanced stages.

The local CIO union is active as usual in such conditions and the discussion of strike and union contract at the Hoover & Mason plant which started with the vote of their employes some two months ago to have the CIO act as their bargaining agents, is still under progress. The union had never been able to make much headway with H & M employes, though other plants had been under union contract for several years, because H & M wages were already in excess of union scale. As the other plants gradually increased wages, it became possible for the union to get the vote of H & M employes to let them bargain for increases,

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Ammonia Liquor :: Anhydrous Ammonia

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again asking for 12 cents per hour more than any other plant pays. H & M were willing to go up to the highest level paid by any other plant, taking an advance of 2½ cents per hour but no higher, and there the matter stands, with the union unwilling to call in the Labor Board, and the company not allowed to do so.

Change of name of the International Agricultural Corporation to that of International Minerals & Chemical Corporation has been finally effected and four shares of the LAC common stock is being exchanged for one share of the new common stock with $5.00 par value. The company has recently added to its large purchases in Hickman County a large tract at Shady Grove in Hickman County, and is reported as intending to construct a plant there to be served by a branch line of the N. C. & St. L. Railway from Lyle or Wrigley. The location is about fifteen miles from Columbia, 12 miles from Mt. Pleasant and fifteen miles from Centerville and is in the heart of one of the great undeveloped phosphate areas of Tennessee and only a few miles above the largest of the three dams some day to be built by TVA to make Duck River navigable.

CHICAGO

Slow Market on Fertilizer Organics with Better Demand Expected. Feed Materials Show Active Interest.

Exclusive Correspondence to "The American Fertilizer."

CHICAGO, April 20, 1942.

Slow organic markets are still in evidence, and while offerings are slightly increasing, the demand is light. This is attributed to scarcity of mineral ammoniates. Sellers continue predicting, however, that there will be sufficient demand before the end of the season to absorb all available stocks.

Digester tankage and meat scraps appear to be in active demand at ceiling prices. A broadened interest in dry rendered tankage has resulted, while wet rendered tankage remains quiet, owing, probably, to light supply.

Nominal prices are as follows: High grade ground fertilizer tankage, $4.00 to $4.25 ($4.86 to $5.16½ per unit N) and 10 cents; standard grades crushed feeding tankage, $5.30 to $5.50 ($6.44 to $6.68½ per unit N) and 10 cents; blood, $5.60 to $5.70 ($6.80½ to $6.93 per unit N); dry rendered tankage, $1.15 to $1.20 per unit of protein, Chicago basis.

SAFEGUARDING A PLANT AGAINST SABOTAGE

(Continued from page 5)

entering the property, and in some cases on leaving. This system, of course, must be implemented by clear and definite instructions to plant policemen, to insure that the passes are closely examined when presented. In the larger operations, the passes are supplemented by a system which requires every employee to wear that anyone without such a button is subject to immediate detection by supervisors and a numbered button while on the property, so operators.

Employees visiting a plant or temporarily at work there are issued special buttons which must be worn conspicuously at all times. Employees of construction contractors working within the plant enclosures are provided with special badges and, where physically possible, are confined to their actual work area by industrial fencing.

Related to the surveillance of personnel is the routine *close* inspection of freight cars, trucks, and other vehicles coming into the property. Lunch boxes are inspected at intervals and, in some cases, it is feasible to prohibit carrying them into the working zones proper.

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An important factor in the quality of such crops as cotton and corn is the chemical make-up of the soil. If it contains the proper proportion of potash to other plant-foods high yields of good quality are assured.

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These two important crops depend upon a fertilizer that includes enough potash to make up for deficiencies in the soil. Fertilizer manufacturers can depend upon SUNSHINE STATE POTASH because of its uniform analysis and careful sizing which makes blending easy.

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In these cases the boxes are kept in a central lunchroom or service building.

These measures, of course, constitute but a part of the entire plant protection program. Of equal importance are the means taken to protect the property physically. This involves the complete fencing of all property, with careful thought given to placing the fence in such a way as to preclude access over or through it. At the same time the number of gates and other openings should be reduced to an absolute minimum. Those that are retained should be installed at a guardhouse equipped with a telephone and other accessories. All gates should be kept closed and locked except when in actual use.

A plant is more vulnerable to entry by force at night. This can be minimized by adequate lighting of fence lines, gates, yard areas, and building approaches. Floodlights should be erected so as to provide overlapping illumination without gaps or dark spots. They should be on standards high enough to prevent tampering, and electric lines should be placed *within* the patrolled zone. Switches and other apparatus should be out of reach of everyone except authorized persons.

But equipment alone cannot keep out agents of outside interests assigned to damage or throw a plant or a unit out of production. Constant patrols must be maintained within plants proper, and particularly within fence lines. In some instances, squad cars carrying two men armed with pistols and shotguns are advisable and, now that tire stealing has become as serious a crime against an individual as was the theft of a man's mount in pioneer days, such squads are necessary to insure that employee cars on parking lots are not molested.

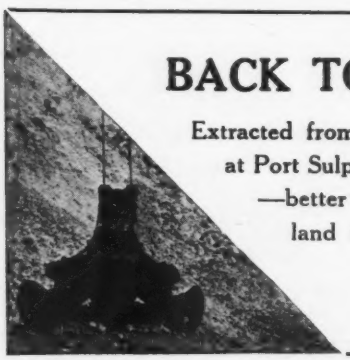
Some plants have used police dogs to advantage—not only for their alertness and ability to smell out men bent on trouble, but for the companionship and protection they afford a patrolman making his lonesome rounds at night.

Effective execution of any plant protection plan is based on an adequate, well-equipped, and well-trained police force. Under present conditions, the duties of such a force go much further than do those of the old-time watchmen. Police in Monsanto plants are chosen for their youth, alertness, physical bearing, and integrity. Every man has cleared the fingerprint office of the Federal Bureau of Investigation. They are uniformed and armed. Arms were issued only after each man had been thoroughly instructed in their use, so that he would not use them unwisely but could employ them effectively when necessary. Uniforming heightens the policemen's sense of responsibility and raises their morale.

The duties of the plant police force include manning of all gates; inspection of personnel and vehicles entering the property; patrolling the fence line, the buildings, and the yard areas; and the enforcement of the plant protection program in general.

On defense of plants and of key industrial operations the advice and consultation of the Federal Bureau of Investigation are available. This service is of inestimable help in setting up and operating the program.

The important policy to be followed is the treatment of the problem as a whole and planning for its handling in a unified, coordinative manner. And most important is the factor that the most valuable asset any group of stockholders possesses is not a plant, not a process, not an inventory, but the men and women who have been trained to carry on the work. Thus the protection of personnel against injury caused by the acts of outsiders is the chief reason for protection of facilities.



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Use of part ordinary superphosphate instead of all triple superphosphate, thus effecting a further saving in cost.

The nitrogen in UAL is completely available, leaching resistant, and relatively low in unit cost!

UAL-A UAL-B UAL-37

Specific information, giving typical formulas for making both high-analysis and single-strength mixtures with UAL, together with facts about the advantages and methods of cooling fertilizers for more rapid curing and superior condition, will be sent on request.

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E. I. DU PONT DE NEMOURS & CO. (INC.)
AMMONIA DEPARTMENT • WILMINGTON, DELAWARE

WARTIME STARTER SOLUTIONS TO MEET PRESENT EMERGENCY

(Continued from page 9)

solutions. Comparing the other treatments with these, it is evident that certain commercial fertilizer mixtures now obtainable gave very satisfactory results when used for starter solutions, particularly treatment No. 8 (10 pounds of 4-16-4 fertilizer), treatment No. 5 (10 pounds of 5-10-5 nonacid mixture), treatment No. 10 (10 pounds of 5-10-5 acid mixture), and treatments Nos. 12 and 13 (10 pounds of 5-10-10 of acid and nonacid mixtures, respectively). Each of these treatments produced marked stimulation of the plants, comparing favorably with the standard starter solutions, and were markedly superior to plain water used in transplanting (treatment No. 26). Fig. 1 shows typical plants from these

Table 1

*Effect of Various Starter Solutions on Rate of Growth of Tomato Plants.**

Treatment No.	Ingredients per 50 gal. Water	Acidity of Solution, pH	Av. Height of Plants in 23 Days, in.	Av. Per Cent of Plants Showing Blossom Clusters	Quality of Plants†	Remarks
2	6 lbs. 20% superphosphate	4.79	10½	33	F	Spindling; show nitrogen deficiency
3	4 lbs. Ammo Phos 11-48-0	5.01	11	75	E	
4	1 lb. Actomag (26% MgO)	9.30‡	9	0	P	Very spindling and purple; lower leaves yellow
5	10 lbs. 5-10-5 non-acid	5.32	11	92	E	Sturdy plants
6	5 lbs. 5-10-5 non-acid	5.74	9½	58	G	Phosphorus deficiency; purple tinge; spindling
7	10 lbs. 3-12-6 non-acid	5.45	9¼	50	G	Purple tinge; spindling
8	10 lbs. 4-16-4	5.00	10½	92	E	
10	10 lbs. 5-10-5	5.48	10¾	92	E	
11	5 lbs. 5-10-5	5.64	10	75	G	Purple; spindling
12	10 lbs. 5-10-10	5.33	11¾	83	E	
13	10 lbs. 5-10-10 non-acid	5.44	11	83	E	
14	2⅔ lbs. di-ammonium phosphate, 1 lb. di-potassium phosphate	7.80‡	12½	100	E	Strong suckers; plants busy
15	2⅔ lbs. di-ammonium phosphate, 1⅓ lbs. di-potassium phosphate	7.85‡	11½	92	E	
20	4 lbs. 11-32-14	5.45	11½	100	E	
21	4 lbs. 13-26-13	5.41	12	100	E	
23	4 lbs. 11-32-14, 1 lb. Actomag (26% MgO)	5.93	10½	92	E	Very stocky
24	4 lbs. 11-32-14 and ½ lb. $MgSO_4$	6.12	10¾	100	E	Very stocky
25	2⅔ lbs. di-ammonium phosphate, 1⅓ lbs. di-potassium phosphate, ½ lb. magnesium sulphate	7.49‡	11	92	E	Very stocky; strong suckers
26	Water only	7.52‡	8¾	0	P	Spindling; purple leaves; no suckers
27	5 lbs. 4-16-4	5.17	10¼	83	G	Spindling

* All solutions were used at the rate of ¼ pint per plant.
† E = Excellent; G = Good; F = Fair; P = Poor. Plants were about 6 inches tall when transplanted 23 days earlier.
‡ Alkaline solution.

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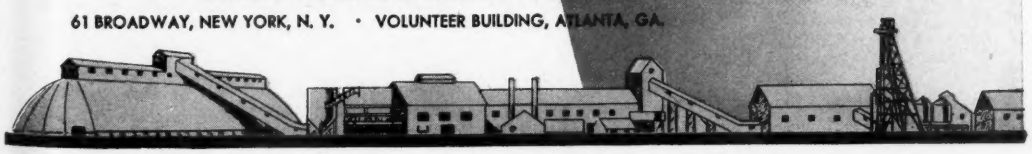

treatments and gives an idea of the relative sturdiness, vigor of the plants, and size of the root systems. Each of these particular mixtures is also recommended in Cornell Extension Bulletin 455 as an "approved fertilizer" for tomato fields. Consequently, the grower could use the same mixture for his field fertilization and for his starter solution.

Altho these field fertilizer mixtures proved very effective when used as a starter solution, they require a little more care than the standard starter mixtures (Nos. 20 and 21) previously used, because of the larger amount of insoluble residue in the field type fertilizers. To use these materials effectively they should be first dissolved in a separate container. It might be more convenient to make up stock solutions on the basis of 1 pound of the fertilizer mixture per gallon of water, which should be frequently stirred so as to hasten solution of the material. One gallon of this solution can then be poured off for each pound of material desired in the transplanting mixture. It should be strained before pouring into the transplanting machine sa as not to clog tubes.

There are still obtainable considerable quantities of the standard starter solution mixtures which had been prepared by the fertilizer dealers previous to the war emergency. Growers would do well to take advantage of these stocks as long as they are available, but when the supply is exhausted the field fertilizer mixtures previously discussed can be substituted.

Rate of Application

Field experiments have shown that 4 pounds per 50 gallons of water of the standard starter solution mixtures, such as the 11-32-14 and the 13-26-13 mixtures, have given better results than greater concentrations and these materials should be used at this rate. However, if regular fertilizer mixtures are used for starter solutions, they should be used at a considerably heavier rate in order to get equal amounts of nutrients. For example, 4 pounds of the 11-32-14 mixture would supply 44 units of nitrogen, 128 units of phosphoric acid and 56 units of potash. Four pounds of the 13-26-13 mixture would supply 52 units of nitrogen, 104 units of phosphoric acid and 52 units of potash.

To approximate these quantities, it is necessary to use about 10 pounds of the mixed standard fertilizers. For example, 10 pounds of a 5-10-5 mixture supplies 50 units of nitrogen, 100 units of phosphoric acid, and 50 units of potash, which is a very close approximation to 4 pounds of the 13-26-13 mixture. It is evident, therefore, that 5 pounds of a 5-10-5 mixture would only supply half as much. This undoubtedly accounts for the fact that the 5-pound rate of 5-10-5, treatments Nos. 6 and 11, did not produce as good plants as the 10-pound rate of the same fertilizer mixtures, treatments Nos. 10 and 5.

Similarly, 10 pounds of a 4-16-4 mixture will supply 40 units of nitrogen, 160 units of phosphoric acid and 40 units of potash. It is evident, therefore, that this heavy rate of application supplies only four-fifths as much nitrogen and potash as 4 pounds of the standard starter solution mixture, but the 4-16-4 mixture does supply more phosphoric acid. However, the phosphoric acid in the standard fertilizer mixture is derived from superphosphate which is not so completely water-soluble as the phosphoric acid in Ammo Phos, which is the source of phosphorus in the starter solution mixtures. Consequently, it is probable that approximately equal amounts of phosphoric acid are supplied in the solution from 10 pounds of a 4-16-4 mixture and 4 pounds of a 11-32-14 starter solution.

It is evident from a comparison of treatment No. 5 (10 pounds 5-10-5) with treatment No. 7 (10 pounds 3-12-6) that the higher ratio of nitrogen was a considerable advantage when used as a starter solution.

In all of the comparisons the 10-pound rate of application was more effective than the 5-pound rate, and there was no sign of any toxic concentration or any injurious effect on the plants from any of the solutions reported in this experiment.

(Continued on page 24)

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Nonacid vs. Acid-forming Fertilizers

The experiment included three comparisons of acid and nonacid mixtures of corresponding formulas, namely, an acid vs. nonacid 5-10-5 at the rate of 10 pounds per 50 gallons of water (treatment No. 10 vs. treatment No. 5), a similar comparison at the rates of 5 pounds per 50 gallons of water (treatment No. 11 vs. treatment No. 6) and a comparison of an acid vs. nonacid 5-10-10 formula at the rate of 10 pounds per 50 gallons of water (treatment No. 12 vs. treatment No. 13).

There was no apparent difference in the effectiveness of the acid fertilizers as compared with the nonacid forming mixtures when used as a starter solution. Examination of the column entitled "Acidity of Solution" in Table 1 shows that there was no significant difference in the acidity of each pair of solutions. The nonacid mixture in each case made just as acid a solution as the acid-forming mixture. This is no reflection on the integrity of the mixtures labeled "nonacid." In such mixtures limestone has been added in sufficient quantity to neutralize the residual acidity of the fertilizer after its reaction with the soil, but the limestone is so slightly water-soluble it did not reduce the acidity of the starter solution.

Two magnesium salts were added to several of the mixtures to determine the value of magnesium in the starter solution. Comparing treatments Nos. 23 and 24 with treatment No. 20, it is evident that adding either magnesium sulfate (treatment No. 24) or Actomag (treatment No. 23) showed no particular advantage over treatment No. 20, the same mixture without the magnesium. Again, treatments No. 15 and No. 25 show a similar comparison and no advantage in adding magnesium salt. Treatment No. 4 shows the stunting effect of the magnesium salt alone, and when this is compared with treatment No. 23 it is evident that the other fertilizers in the mixture overcome the detrimental effect of the magnesium alone. The value of all of these treatments is shown by comparing them with water only used in transplanting (treatment No. 26).

The two soils used in this test were radically different, particularly in their buffering capacity. It was expected that if any toxic effect of any of the fertilizers occurred, it would become apparent particularly in the acid, poorly buffered, sandy soil. The effect of each treatment was remarkably consistent on the two soils, and no injury developed from any of the treatments except No. 4 that are recorded in Table 1. The beneficial effects of any treatment were similar on each soil, and it seems evident that the treatments recommended may be used with safety on soils of these widely different types.

Therefore it seems that at least on soils similar to the ones tested in this experiment that a regular field fertilizer mixture may be used satisfactorily as a starter solution if care is taken to strain off the insoluble residue. The 5-10-5; 4-16-4; and 5-10-10 commercial mixtures, both acid-forming and nonacid forming types, proved very satisfactory in these tests when used at the rate of 10 pounds of the fertilizer mixture per 50 gallons of water.

PASTURE NOTES

(Continued from page 7)

factory production for more seasons than land not properly fertilized. Hay, silage, and pasture can all be used directly to replace grain in the dairy ration at a much lower cost per 100 pounds of milk produced."

New York

Fertilizer Profitable on Ladino Clover. A pasture mixture of 2 pounds of Ladino clover and 12 pounds of Kentucky bluegrass, seeded on prepared land, produced excellent hay and pasture. The application of 100 pounds of nitrate of soda per acre in addition to limestone and superphosphate proved profitable and desirable in experiments at the Mount Pleasant Grazing Area, stated Dr. E. S. Harrison at the recent Farm and Home Week.—Rural New Yorker, Mar. 7, 1942.

North Carolina

Increases Carrying Capacity. R. B. Brown of Ashe County reports that one pasture which received applications of superphosphate and lime now will graze four times as many cattle as before.

(Continued on page 26)

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Agricultural authorities have shown that a lack of Boron in the soil can result in deficiency diseases which seriously impair the yield and quality of crops.

When Boron deficiencies are found, follow the recommendations of local County Agents or State Experiment Stations.

Information and references available on request.

AMERICAN POTASH & CHEMICAL CORPORATION
70 PINE STREET, NEW YORK CITY
Pioneer Producers of Muriate of Potash in America

See Page 4

Ohio

Use More Fertilizer. The most important fertilizer application on general or livestock farms is the application on the grain crops with which new seedings are made. These applications may be profitably increased 50 to 100 or even 150 pounds per acre over the common applications used in the past. Grades like 2-12-6 and 0-14-6 are recommended for these crops with 20 per cent superphosphate on heavily manured field, says Earl Jones, extension agronomist.—Ohio Farm Bureau News, Mar., 1942.

Oregon

Fertilizer Increases Grass Seed.—Nitrogen or nitrogen in combination with phosphorus has returned a profit on practically every variety of grass grown for seed on every soil type in the Williamette valley, reports Art King, extension soils specialist. He recommends applying fertilizer through an attachment on a drill or with some type of broadcast spreader in March, with another application in mid-April.

Irrigated Clover Pastures Valuable. A study of 47 irrigated pastures showed a total maintenance cost of $11.25 per acre with only $1.51 per acre for fertilizers and 40 per cent of the pastures were fertilized. Pastures where Ladino clover predominated out-yielded other pastures and produced the lowest cost per day of grazing. One hundred forty-six bluegrass pastures cost less for maintenance but more per day of grazing than the mixed-grass pastures.—Ore. Agr. Exp. Sta. Bul. 391, 1941.

Pennsylvania

Good Pastures Return Dividends. "A dollar invested in pasture improvement yields $10 in returns," says Dr. Fred V. Grau, extension agronomist, in summarizing three years of pasture demonstrations. The best pastures have received an average of 200 pounds of fertilizer a year for the past five years. Rotational pastures, including Ladino clover have shown up particularly well. He suggests early spring seeding, or in late summer without a nurse crop but with about 400 pounds of 4-12-4, with late fall treatment with phosphated manure.—Pennsylvania Farmer, Feb., 1942.

Rhode Island

Save Labor and Feed. Because of the labor shortage, improved pastures are of greater importance than ever. Fertilized pastures produce three times as much feed and at one-half the cost as compared to unimproved pastures. On grass pastures use 300 to 400 pounds per acre of high-nitrogen fertilizer. Legume pastures respond to the equivalent of 4-16-20 at 300 to 400 pounds per acre, says R. S. Shaw, extension agronomist.—Better Rural Life.

Tennessee

Fertilizers Make Luxuriant Pastures. "The use of phosphate and lime in some cases and (in case of potash-deficient soils) phosphate, potash, and lime, is working wonderful transformations on the pastures of the South. Farmers who did not realize they could grow grass now have luxuriant pastures. Of course, the fertilization of these pastures will have to be continued in the future."—L. R. Neel, Southern Agriculturist, Mar., 1942.

Texas

Big Increase in Pasture Fertilization. From reports received from 65 counties, there was an increase of 240 per cent in number of farmers fertilizing pastures and a 550 per cent increase in pasture acreage fertilized in 1941 over 1940. M. K. Thornton, agricultural chemist, reports that where pastures were fertilized, livestock production increased and the quality of calves, lambs, and other young stock also improved.

Wisconsin

Good Pasture! Dollars are in Those Words. The above is the heading of an excellent article by C. J. Chapman, extension soils specialist. He mentioned two pasture tests which averaged 14,780 pounds milk per ton of nitrogen fertilizer used and at an increased return above fertilizer cost of $15.50 per acre in less than one summer's time. The importance of nitrogen fertilizer, when it can be obtained, is stressed along with other plant foods. A pound of nitrogen, if all converted by crops, will produce about six pounds of protein, equivalent to 40 pounds of wheat bran.—Hoard's Dairyman, Mar. 25, 1942.

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Charleston, S. C.

BUYERS' GUIDE

A CLASSIFIED INDEX TO ALL THE ADVERTISERS IN "THE AMERICAN FERTILIZER"

This list contains representative concerns in the Commercial Fertilizer Industry, including fertilizer manufacturers, machinery and equipment manufacturers, dealers in and manufacturers of commercial fertilizer materials and supplies, brokers, chemists, etc.
For Alphabetical List of Advertisers, see page 33.

ACID BRICK
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.

ACID EGGS
Chemical Construction Corp., New York City.

ACIDULATING UNITS
Chemical Construction Corp., New York City.
Sackett & Sons Co., The A. J., Baltimore, Md.

AMMO-PHOS
American Cyanamid Co., New York City.

AMMONIA—Anhydrous
Barrett Division, The, Allied Chemical & Dye Corp., New York City.
DuPont de Nemours & Co., E. I., Wilmington, Del.
Hydrocarbon Products Co., New York City.

AMMONIA LIQUOR
Barrett Division, The, Allied Chemical & Dye Corp., New York City.
DuPont de Nemours & Co., E. I., Wilmington, Del.
Hydrocarbon Products Co., New York City.

AMMONIA OXIDATION UNITS
Chemical Construction Corp., New York City.

AMMONIATING EQUIPMENT
Sackett & Sons Co., The A. J., Baltimore, Md.

AMMONIUM NITRATE SOLUTIONS
Barrett Division, The, Allied Chemical & Dye Corp., New York City.

AUTOMATIC ELEVATOR TAKEUPS
Sackett & Sons Co., The A. J., Baltimore, Md.

BABBITT
Sackett & Sons Co., The A. J., Baltimore, Md.

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Bemis Bro. Bag Co., St. Louis, Mo.

BAGS—Cotton
Bemis Bro. Bag Co., St. Louis, Mo.

BAGS—Paper
Bagpak, Inc., New York City.
Bemis Bro. Bag Co., St. Louis, Mo.

BAGS (Waterproof)—Manufacturers
Bemis Bro. Bag Co., St. Louis, Mo.

BAGS—Dealers and Brokers
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Baker & Bro., H. J., New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Taylor, Henry L., Wilmington, N. C.
Wellmann, William E., Baltimore, Md.

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Atlanta Utility Works, East Point, Ga.
Bagpak, Inc., New York City.
Sackett & Sons Co., The A. J., Baltimore, Md.

BAG PILERS
Link-Belt Company, Philadelphia, Chicago.

BEARINGS
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

BELT LACING
Sackett & Sons Co., The A. J., Baltimore, Md.

BELTING—Chain
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

BELTING—Leather, Rubber, Canvas
Sackett & Sons Co., The A. J., Baltimore, Md.

BOILERS—Steam
Atlanta Utility Works, East Point, Ga.

BONE BLACK
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Huber & Company, New York City.

BONE PRODUCTS
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
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Bradley & Baker, New York City.
Huber & Company, New York City.
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McIver & Son, Alex. M., Charleston, S. C.
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Keim, Samuel L., Philadelphia, Pa.
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BUCKETS—For Hoists, Cranes, etc., Clam Shell, Orange Peel, Drag line, Special; Electrically Operated and Multi Power
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.

BURNERS—Sulphur
Chemical Construction Corp., New York City.

BURNERS—Oil
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Sackett & Sons Co., The A. J., Baltimore, Md.

CABLEWAYS
Hayward Company, The, New York City.

CARBONATE OF AMMONIA
American Agricultural Chemical Co., New York City.
DuPont de Nemours & Co., E. I., Wilmington, Del.

CARS—For Moving Materials
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
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CARTS—Fertilizer, Standard and Roller Bearing
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Sackett & Sons Co., The A. J., Baltimore, Md.

CASTINGS—Acid Resisting
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Duriron Co., Inc., The, Dayton, Ohio.

CASTINGS—Iron and Steel
Link-Belt Company, Philadelphia, Chicago.
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Stedman's Foundry and Mach. Works, Aurora, Ind.

CEMENT—Acid-Proof
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.

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Sackett & Sons Co., The A. J., Baltimore, Md.
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CHAINS AND SPROCKETS
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CHAMBERS—Acid
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.

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Duriron Co., Inc., The, Dayton, Ohio.
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Huber & Company, New York City.

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Phosphate Mining Co., The, New York City.
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Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.

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American Limestone Co., Knoxville, Tenn.
Dickerson Co., The, Philadelphia, Pa.
Phosphate Mining Co., The, New York City.

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Chemical Construction Corp., New York City.

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Tennessee Corporation, Atlanta, Ga.

COTTONSEED PRODUCTS
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Huber & Company, New York City.
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Schmaltz, Jos. H., Chicago, Ill.
Taylor, Henry L., Wilmington, N. C.
Wellmann, William E., Baltimore, Md.

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Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

DRYERS—Direct Heat
Sackett & Sons Co., The A. J., Baltimore, Md.

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ELEVATORS AND CONVEYORS—Portable
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

ENGINEERS—Chemical and Industrial
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Fairlie, Andrew M., Atlanta, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

ENGINES—Steam
Atlanta Utility Works, East Point, Ga.
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Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Link Belt Speeder Corp., Chicago, Ill., and Cedar Rapids, Iowa.

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American Agricultural Chemical Co., New York City.
American Cyanamid Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Farmers Fertilizer Co., Columbus, Ohio
International Minerals & Chemical Corporation, Chicago, Ill.
Phosphate Mining Co., The, New York City.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.

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Taylor, Henry L., Wilmington, N. C.
Wellmann, William E., Baltimore, Md.

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Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
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Wellmann, William E., Baltimore, Md.

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Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

GEARS—Silent
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

GELATINE AND GLUE
American Agricultural Chemical Co., New York City.

GUANO
Baker & Bro., H. J., New York City.

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Hayward Company, The, New York City.

HOPPERS
Atlanta Utility Works, East Point, Ga.
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Bradley & Baker, New York City.
Wellmann, William E., Baltimore, Md.

IRON SULPHATE
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INSECTICIDES
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Bradley & Baker, New York City.
McIver & Son, Alex. M., Charleston, S. C.
Wellmann, William E., Baltimore, Md.

LOADERS—Car and Wagon, for Fertilizers
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

MACHINERY—Acid Making
Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
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Duriron Co., Inc., The, Dayton, Ohio.
Fairlie, Andrew M., Atlanta, Ga.
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Hayward Company, The, New York City.
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MACHINERY—Elevating and Conveying
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Link-Belt Company, Philadelphia, Chicago.
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Stedman's Foundry and Mach. Works, Aurora, Ind

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Link-Belt Company, Philadelphia, Chicago.
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Stedman's Foundry and Mach. Works, Aurora, Ind.

MACHINERY—Pumping
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Duriron Co., Inc., The, Dayton, Ohio.

MACHINERY—Tankage and Fish Scrap
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MAGNETS
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MANGANESE SULPHATE
McIver & Son, Alex. M., Charleston, S. C.
Tennessee Corporation, Atlanta, Ga.

MIXERS
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

NITRATE OF SODA
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Barrett Division, The, Allied Chemical & Dye Corp., New York City.
Bradley & Baker, New York City.
Chilean Nitrate Sales Corp., New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

NITRATE OVENS AND APPARATUS
Chemical Construction Corp., New York City.

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Bradley & Baker, New York City.
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Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
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Smith-Rowland Co., Norfolk, Va.
Wellmann, William E., Baltimore, Md.

NOZZLES—Spray
Monarch Mfg. Works, Philadelphia, Pa.

PACKING—For Acid Towers
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.

PANS AND POTS
Stedman's Foundry and Mach. Works, Aurora, Ind.

PHOSPHATE MINING PLANTS
Chemical Construction Corp., New York City.

PHOSPHATE ROCK
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American Cyanamid Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Charleston Mining Co., Inc., Richmond, Va.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Phosphate Mining Co., The, New York City.
Ruhm, H. D., Mount Pleasant, Tenn.
Schmaltz, Jos. H., Chicago, Ill.
Southern Phosphate Corp., Baltimore, Md.
Taylor, Henry L., Wilmington, Del.
Wellmann, William E., Baltimore, Md.

PIPE—Acid Resisting
Duriron Co., Inc., The, Dayton, Ohio.

PIPES—Chemical Stoneware
Chemical Construction Corp., New York City.

PIPES—Wooden
Stedman's Foundry and Mach. Works, Aurora, Ind.

PLANT CONSTRUCTION—Fertilizer and Acid
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

POTASH SALTS—Dealers and Brokers
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
Jett, Joseph C., Norfolk, Va.
Schmaltz, Jos. H., Chicago, Ill.
Taylor, Henry L., Wilmington, Del.
Wellmann, William E., Baltimore, Md.

POTASH SALTS—Manufacturers
American Potash and Chem. Corp., New York City.
Potash Co. of America, New York City.
International Minerals & Chemical Corp., Chicago, Ill.
United States Potash Co., New York City.

PULLEYS AND HANGERS
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

PUMPS—Acid-Resisting
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Duriron Co., Inc., The, Dayton, Ohio.
Monarch Mfg. Works, Inc., Philadelphia, Pa.

PYRITES—Brokers
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., New York City.
Wellmann, William E., Baltimore, Md.

QUARTZ
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.

RINGS—Sulphuric Acid Tower
Chemical Construction Corp., New York City.

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McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
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SCREENS
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Link-Belt Company, Philadelphia, Chicago.
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SEPARATORS—Magnetic
Sackett & Sons Co., The A. J., Baltimore, Md.
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Link-Belt Company, Philadelphia, Chicago.
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Link-Belt Company, Philadelphia, Chicago.
Link-Belt Speeder Corp., Chicago, Ill., and Cedar Rapids, Iowa.
Sackett & Sons Co., The A. J., Baltimore, Md.

SPRAYS—Acid Chambers
Monarch Mfg. Works, Inc., Philadelphia, Pa.

SPROCKET WHEELS (See Chains and Sprockets)

STACKS
Sackett & Sons Co., The A. J., Baltimore, Md.

SULPHATE OF AMMONIA
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Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
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Wellmann, William E., Baltimore, Md.

SUPERPHOSPHATE
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Ashcraft-Wilkinson Co., Atlanta, Ga.
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Huber & Company, New York City.
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SYPHONS—For Acid
Monarch Mfg. Works, Inc., Philadelphia, Pa.

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Taylor, Henry L., Wilmington, N. C.
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TANKAGE—Garbage
Huber & Company, New York City.

TANKS
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TILE—Acid-Proof
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TOWERS—Acid and Absorption
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UREA
DuPont de Nemours & Co., E. I., Wilmington, Del.

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VALVES—Acid-Resisting
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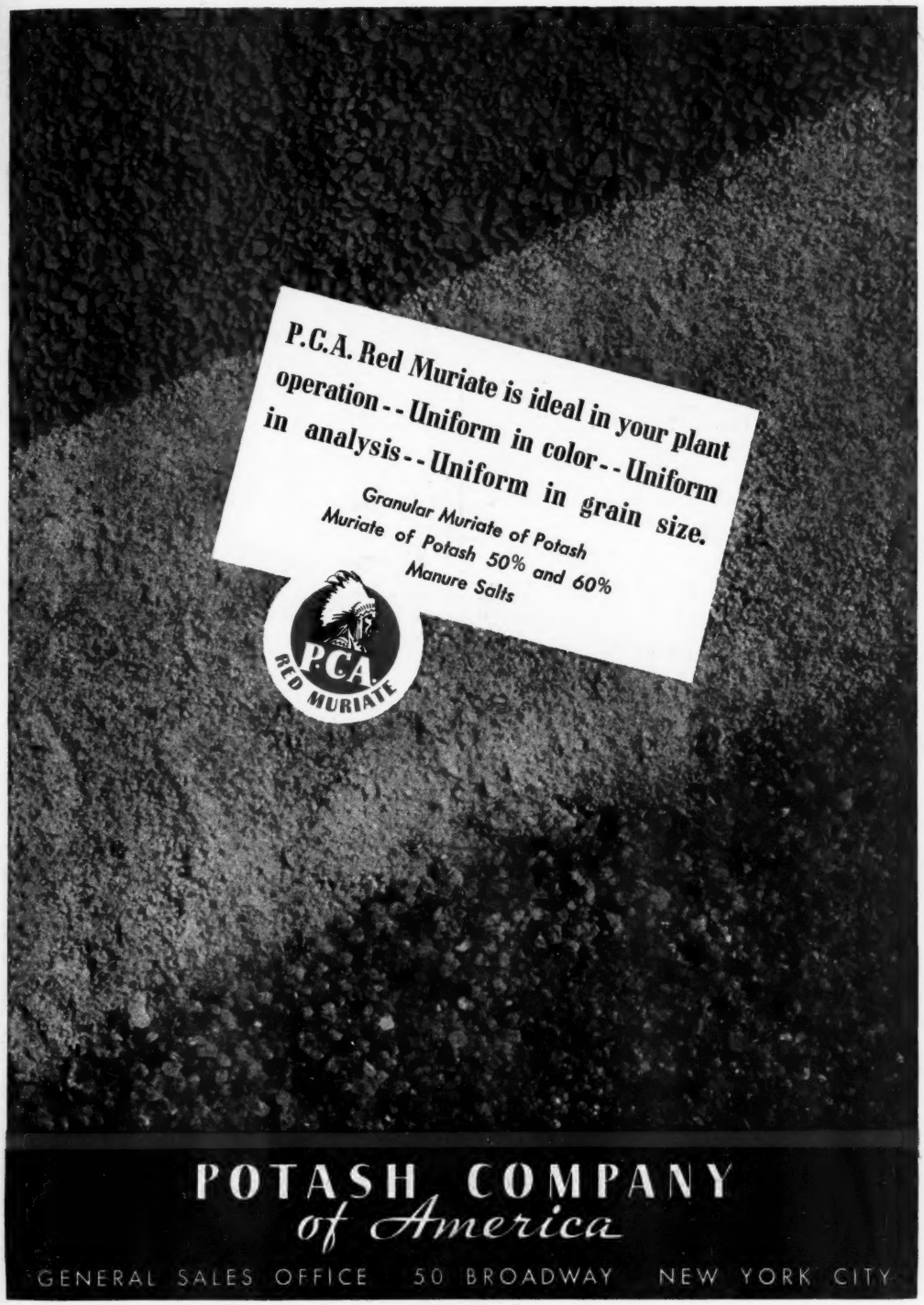
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